

### **Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

### **Listing of Claims:**

1. (Original) A method of generating an image transform for modifying a digital image, comprising:
  - a) detecting a vanishing point related to the selected image;
  - b) determining a preferable vanishing point location; and
  - c) generating an image transform based on the vanishing point location and the preferable vanishing point location.
2. (Original) The method claimed in claim 1, further comprising applying the image transform to the digital image to produce a transformed image.
3. (Original) The method claimed in claim 2, further comprising the step of generating the image transform in such a manner that a detected vanishing point of the transformed image is coincident with the preferable vanishing point location.
4. (Previously Amended) A method of detecting an amount of rotation between the vertical axes of a scene and an image of the scene, comprising:
  - a) detecting a set of vanishing points related to the image;
  - b) selecting a set of vanishing points corresponding to a vertical axis of the scene based on a predetermined criteria, wherein the predetermined criteria is a threshold operation to select a vanishing point that is greater than a predetermined distance from the center of the image; and
  - c) using the selected vanishing points to detect the rotation of the image.
5. (Canceled)

6. (Previously Amended) The method claimed in claim 4, wherein the image has x' and y' axes and the predetermined criteria is:

$$|x_G| > T_l$$

OR

$$|y_G| > T_l$$

where the vanishing points are represented by vanishing point vectors  $v_G = (x_G, y_G, z_G)$  with relation to a Gaussian sphere located on a z-axis with respect to the image at a distance  $f$  away from the image plane,  $f$  representing an approximation of the focal length of a camera lens employed to photograph the image; and  $T_l$  is a predetermined constant; and the rotation is determined by calculating the angles between an  $x$  or  $y$  axis of the Gaussian sphere and the selected vanishing point vectors and choosing the smallest angle as the rotation.

7. (Previously Amended) The method claimed in claim 4, wherein the image has x' and y' axes and the predetermined criteria is:

$$|x_G| > T_l$$

OR

$$|y_G| > T_l$$

where the vanishing points are represented by vanishing point vectors  $v_G = (x_G, y_G, z_G)$  with relation to a Gaussian sphere located on a z-axis with respect to the image at a distance  $f$  away from the image plane,  $f$  representing an approximation of the focal length of a camera lens employed to photograph the image; and  $T_l$  is a predetermined constant; and the rotation is determined by calculating the angles between an axis of the Gaussian sphere parallel to the vertical axis of the image and the selected vanishing point vectors and choosing the smallest angle as the rotation.

8. (Original) The method claimed in claim 6, wherein  $0.3 < T_l < 1$ , and the angles between the  $y$  axis and the vanishing point vector are

$$\gamma = \text{sign}(x_G y_G) \cos^{-1}(v_{Gxy} \cdot [0, 1, 0])$$

$$\gamma = \text{sign}(x_G y_G) \cos^{-1}(v_{Gxy} \cdot [0, -1, 0])$$

and the angle between the  $x$  axis and the vanishing point vector is

$$\gamma = \text{sign}(x_G y_G) \cos^{-1}(v_{Gxy} \cdot [1, 0, 0])$$

$$\gamma = \text{sign}(x_G y_G) \cos^{-1}(v_{Gxy} \cdot [-1, 0, 0])$$

where  $v_{Gxy} = \frac{[x_G, y_G, 0]}{\sqrt{x_G^2 + y_G^2}}$  and  $\text{sign}(x_G y_G)$  is 1 if the signs of  $x_G$  and  $y_G$  are similar and  $\text{sign}(x_G y_G)$  is -1 if the signs of  $x_G$  and  $y_G$  are dissimilar.

9. (Original) The method claimed in claim 7, wherein  $T_l=0.5$ .

10. (Previously Amended) An apparatus for detecting an amount of rotation between the vertical axes of a scene and an image of the scene, comprising:

- a) means for detecting a set of vanishing points related to the image;
- b) means for selecting a set of vanishing points corresponding to a vertical axis of the scene based on a predetermined criteria, wherein the predetermined criteria is a threshold operation to select a vanishing point that is greater than a predetermined distance from the center of the image; and
- c) means for using the selected vanishing points to detect the rotation of the image.

11. (Canceled)

12. (Previously Amended) The apparatus claimed in claim 10, wherein the image has  $x'$  and  $y'$  axes and the predetermined criteria is:

$$|x_G| > T_l$$

OR

$$|y_G| > T_l$$

where the vanishing points are represented by vanishing point vectors  $v_G = (x_G, y_G, z_G)$  with relation to a Gaussian sphere located on a  $z$ -axis with respect to the image at a distance  $f$  away from the image plane,  $f$  representing an approximation of the focal length of a camera lens employed to photograph the image; and  $T_l$  is a predetermined constant; and the rotation is determined by calculating the angles

between an  $x$  or  $y$  axis of the Gaussian sphere and the selected vanishing point vectors and choosing the smallest angle as the rotation.

13. (Previously Amended) The apparatus claimed in claim 10, wherein the image has  $x'$  and  $y'$  axes and the predetermined criteria is:

$$|x_G| > T_I$$

OR

$$|y_G| > T_I$$

where the vanishing points are represented by vanishing point vectors  $v_G = (x_G, y_G, z_G)$  with relation to a Gaussian sphere located on a  $z$ -axis with respect to the image at a distance  $f$  away from the image plane,  $f$  representing an approximation of the focal length of a camera lens employed to photograph the image; and  $T_I$  is a predetermined constant; and the rotation is determined by calculating the angles between an axis of the Gaussian sphere parallel to the vertical axis of the image and the selected vanishing point vectors and choosing the smallest angle as the rotation.

14. (Original) The apparatus claimed in claim 12, wherein  $0.3 < T_I < 1$ , and the angles between the  $y$  axis and the vanishing point vector are

$$\gamma = \text{sign}(x_G y_G) \cos^{-1}(v_{Gxy} \cdot [0, 1, 0])$$

$$\gamma = \text{sign}(x_G y_G) \cos^{-1}(v_{Gxy} \cdot [0, -1, 0])$$

and the angle between the  $x$  axis and the vanishing point vector is

$$\gamma = \text{sign}(x_G y_G) \cos^{-1}(v_{Gxy} \cdot [1, 0, 0])$$

$$\gamma = \text{sign}(x_G y_G) \cos^{-1}(v_{Gxy} \cdot [-1, 0, 0])$$

where  $v_{Gxy} = \frac{[x_G, y_G, 0]}{\sqrt{x_G^2 + y_G^2}}$  and  $\text{sign}(x_G y_G)$  is 1 if the signs of  $x_G$  and  $y_G$  are

similar and  $\text{sign}(x_G y_G)$  is  $-1$  if the signs of  $x_G$  and  $y_G$  are dissimilar.

15. (Original) The apparatus claimed in claim 14, wherein  $T_I = 0.5$ .

16. (Original) A computer readable medium having computer executable instructions for performing the method of claim 1.

17. (Original) A computer readable medium having computer executable instructions for performing the method of claim 2.

18. (Original) A computer readable medium having computer executable instructions for performing the method of claim 3.

19. (Original) A computer readable medium having computer executable instructions for performing the method of claim 4.

20. (Canceled)

21. (Original) A computer readable medium having computer executable instructions for performing the method of claim 6.

22. (Original) A computer readable medium having computer executable instructions for performing the method of claim 7.

23. (Original) A computer readable medium having computer executable instructions for performing the method of claim 8.

24. (Original) A computer readable medium having computer executable instructions for performing the method of claim 9.

25. (New) A method of generating an image transform for modifying a digital image, comprising:

- a) detecting a vanishing point related to the digital image;
- b) determining from the detected vanishing point an amount of camera rotation relative to a scene at image capture time;
- c) generating an image transform for removing effect of the camera rotation from the digital image; and
- d) applying the image transform to the digital image.

26. (New) The method claimed in claim 25, wherein the detected vanishing point is associated with vertical scene lines.

27. (New) A computer readable medium having computer executable instructions for performing the method of claim 25.

28. (New) A computer readable medium having computer executable instructions for performing the method of claim 26.